CLAIMS:

1. A Pelton turbine system comprising:

a runner mounted for rotation and configured to drive a generator;

a distributor for directing a flow of water to the runner;

at least one high efficiency injector assembly comprising a high efficiency valve configured to provide the flow of water from the distributor to the runner; and

at least one needle valve injector assembly comprising a needle valve for regulating the overall flow of water from the distributor to the runner.

2. The system of claim 1, wherein the valve of the at least one high efficiency injector assembly is a spherical valve.

3. The system of claim 1, wherein the at least one high efficiency injector assembly comprises a spherical valve configured either to provide a fully open flow path between the distributor and the runner in a fully opened position or to fully close the flow path between the runner and the distributor in a closed position.

4. The system of claim 1, wherein the at least one high efficiency injector assembly and the at least one needle valve injector assembly are alternately disposed in the distributor.

5. The system of claim 1, wherein a number of needle valve injector assemblies and a number of high efficiency injector assemblies are selected based upon power requirements of the Pelton turbine and a range of flow between the distributor and the runner.

6. The system of claim 1, further comprising at least two high efficiency injector assemblies having identical sizes.

7. The system of claim 1, wherein a flow rate of the at least one needle valve injector assembly is different from a flow rate of the at least one high efficiency injector assembly.

8. The system of claim 1, wherein an effective cross-sectional flow area of the at least one needle valve injector assembly is smaller than an effective cross-sectional flow area of the at least one high efficiency injector assembly.

9. The system of claim 1, comprising a control circuit configured to automatically operate the high efficiency injector assembly to provide a fully open flow path between the distributor and the runner in a fully opened position or to fully close the flow path between the runner and the distributor in a closed position.

10. The system of claim 9, wherein the control circuit includes an appropriately programmed microprocessor.

11. A Pelton turbine system comprising:

a runner mounted for rotation and configured to drive a generator;

a distributor for directing a flow of water to the runner;

at least one needle valve injector assembly comprising a needle valve for regulating the flow of water from the distributor to the runner; and

at least one high efficiency injector assembly comprising a spherical valve configured either to provide a fully open flow path between the distributor and the runner in a fully opened position or to fully close the flow path in a closed position.

12. The system of claim 11, wherein the at least one high efficiency injector assembly and the at least one needle valve injector assembly are alternately disposed in the distributor.

13. The system of claim 11, wherein a number of needle valve injector assemblies and a number of high efficiency injector assemblies are selected based

upon power requirements of the Pelton turbine and a range of flow between the distributor and the runner.

14. The system of claim 11, further comprising at least two high efficiency injector assemblies having identical sizes.

15. The system of claim 11, wherein a flow path of the at least one needle valve injector assembly is different from a flow path of the at least one high efficiency injector assembly.

16. The system of claim 11, further comprising a control circuit configured to execute a control to automatically operate the high efficiency injector assembly to provide a fully open flow path between the distributor and the runner in a fully opened position or to fully close the flow path between the runner and the distributor in a closed position.

17. The system of claim 16, wherein the control circuit includes an appropriately programmed microprocessor.

18. A retrofittable Pelton turbine injector assembly for improving the efficiency of a Pelton turbine, further comprising a high efficiency valve configured either to provide a fully open flow path between a distributor and a runner of the Pelton turbine or a fully closed flow path in a closed position.

19. A method for operating a Pelton turbine, the method comprising:

opening a needle valve of a needle valve injector assembly and a valve of a high efficiency injector assembly to a direct flow of water from a distributor to a runner; and

controlling the needle valve of the needle valve injector assembly to regulate a desired flow of water from the distributor to the runner.

20. The method of claim 19, further comprising controlling the high efficiency injector assembly and the needle valve injector assembly to provide the desired flow of water to from the distributor to the runner.

21. A method for operating a Pelton turbine, the method comprising:

substantially simultaneously regulating flow through a needle valve of a needle valve injector assembly and a high efficiency valve of a high efficiency injector assembly to direct a flow of water from a distributor to a runner; and

controlling the needle valve injector assembly to provide a desired flow from the distributor to the runner.

22. The method of claim 21, further comprising automatically operating the high efficiency injector assembly to provide a fully open flow path between the distributor and the runner in a fully opened position or to fully close the flow path between the runner and the distributor in a closed position.

23. The method for configuring a Pelton turbine comprising:

disposing at least one needle valve injector assembly between a distributor and a runner of a Pelton turbine to direct flow from the distributor to a runner; and

disposing at least one high efficiency injector assembly between the distributor and the runner to direct a portion of overall flow of water from the distributor to the runner.

24. The method of claim 23, wherein the at least one high efficiency injector assembly and the at least one needle valve injector assembly are alternately disposed in the distributor.

25. The method of claim 23, wherein a number of needle valve injector assemblies and a number of high efficiency injector assemblies are selected based upon power requirements of the Pelton turbine and a range of flow between the distributor and the runner.

26. The method of claim 23, further comprising at least two high efficiency injector assemblies having identical sizes.

27. A method for operating a Pelton turbine comprising:

removing at least one needle valve injector assembly from a Pelton turbine between a distributor and a runner of a Pelton turbine to leave at least one other needle valve injector assembly to direct flow from the distributor to the runner; and

disposing at least one high efficiency injector assembly between the distributor and the runner in place of the removed at least one needle valve injector assembly to direct a portion of overall flow from the distributor to the runner.

28. The method of claim 27, wherein the at least one high efficiency injector assembly and the at least one needle valve injector assembly are alternately disposed in the distributor.

29. The method of claim 27, wherein a number of needle valve injector assemblies and a number of high efficiency injector assemblies are selected based upon power requirements of the Pelton turbine and a range of flow of water between the distributor and the runner.